

SNORKELING APPARATUS

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BACKGROUND

A snorkeling apparatus comprising swimming goggles or a mask in combination with a snorkel is used to allow swimmers to swim continuously face down in the water and provide eye protection from water.

Devices directed to eye protection and/or snorkels are described in U.S. Patent Nos. 3,721,236; 4,286,340; 5,199,421; 5,606,967; 5,915,541; 6,276,362; 6,302,102; 6,309,270; 6,318,363; and 6,405,384. Each of these devices has one or more shortcomings. Among these shortcomings are excessive hydrodynamic drag while swimming and difficulty in clearing the goggles or mask when water leaks in.

SUMMARY

A snorkeling apparatus according to the present invention overcomes shortcomings of prior art devices. The apparatus comprises an eye cover device and a snorkel, the snorkel including hollow bore tubular sections that provide a breathing tube. The eye cover device comprises at least one lense, a frame for holding the lense, and a retainer such as a strap for retaining the device in a watertight relationship on a user's face surface surrounding the eyes of the user.

The frame has a central portion that is to be centrally positioned on the face of the user. In a preferred version of the invention, the snorkel is rigidly connected to the central portion of the frame. The snorkel preferably has a forward projecting section which is located below the water line when the snorkeling apparatus is used, for the purpose of reducing hydrodynamic drag.

In one version of the invention a retainer strap is adapted to loop over the top of the user's head and engage a distal portion of the snorkel to hold it in place, further reducing hydrodynamic drag.

The snorkel typically includes a mouthpiece having an orifice in fluid communication with the breathing tube. In a preferred version of the invention, a purge tube connects the mouthpiece to the eye cover device for purging water from under the lense of the eye cover device. To use the purge tube, a user places his or her tongue over a mouthpiece orifice in communication with the breathing tube, and blows out. The air passes through the purge tube into the space between the user's eyes and the goggles/mask, thereby displacing water therein.

In a scuba version of the invention, the snorkel can have a lower mouthpiece portion and an upper portion that can be moved away from the user's mouth to allow use of a scuba diving regulator.

Thus, a device is provided that allows snorkeling with reduced hydrodynamic drag, and allows purging of water in a hands-free manner without having to remove the mask or goggles.

DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood from the following description, appended claims and accompanying drawings where:

Fig. 1 is a perspective view of a first type of snorkeling apparatus according to the present invention;

Fig. 2 shows the snorkeling apparatus of Fig. 1 being worn by a swimmer;

Fig. 3 is a rear elevation view, partly in section, of the lower portion of the snorkel of the apparatus of Fig. 1;

Fig. 4 is a partial sectional view of the apparatus taken on line 4-4 in Fig. 3;

Fig. 5 is a rear perspective view of the apparatus of Fig. 1, partially broken away;

Fig. 6 is a perspective view of the apparatus of Fig. 1, partially broken away;

Fig. 7 schematically shows a swimmer swimming with a second type of snorkeling apparatus according to the present invention;

Fig. 8 is a side elevation view of a third type of snorkeling apparatus according to the present invention useful for scuba diving;

Fig. 9 is a side elevation view of the apparatus of Fig. 8 partly broken away;

Fig. 10 is a partial sectional view showing details of section 10 in Fig. 9; and

Fig. 11 is a schematic view showing details of a portion of the apparatus of Fig. 8.

DESCRIPTION

A snorkeling apparatus **10** embodying features of the present invention as shown in Figs. 1-7. Although the snorkeling apparatus **10** includes many features of the present invention, it should be appreciated that only some of the features need to be used. Advantages of the present invention are obtainable with less than all of the described features.

The snorkeling apparatus **10** comprises an eye cover device **12** and a snorkel **14**. The eye cover device **12** can be either a mask or goggles, the difference being the number of transparent lenses, a mask having a single large lense and goggles having individual lenses, one for each eye.

The eye cover device **12** has a rigid frame **16** holding substantially transparent eye covers **18** and **19** with a central portion **20** between the eye covers **18** and **19**. The eye cover device **12** can optionally include a portion that covers a user's nose as is common in scuba masks. The frame **16** is made of a substantially rigid material such as synthetic thermoplastic

such as glassed filled nylon and can be formed by injection molding. The lenses **18** and **19** can be held in the frame **16** by placement in a recess (not shown).

At the inner side of the frame **16** there is provided a sealing assembly **21** which includes a seal member **22** which in use is applied in water tight relationship against the surface of a user's face. The seal member **22** has a generally curvilinear configuration corresponding to that of the lense **18** and **19** and is formed as figure "8" so as to be supported by the temple, cheeks and the nasal septum of a user over the user's eyes. The sealing member **22** can be made of elastomer material such as rubber, silicone, urethane or polyvinyl chloride, or of a foam material. The sealing member **22** is held in place by a seal holder **24**.

The rigid frame **16** can be curved to accommodate a user's face with the major viewing portion of the lenses **18** and **19** being in substantially the same horizontal plane to minimize any viewing distortion.

The eye cover **12** includes a retainer assembly **26** comprising a first strap **28**, a second strap **30**, and a pair of strap retainers **32** pivotally attached to the eye cover frame **16**, with the strap retainers **32** holding the straps **28** and **30**. The straps **28** and **30** can be made of elastomeric material and can be provided with vertical indentations, which can be designed in a saw tooth configuration (not shown), and are provided with a clip (not shown) so that the length of the straps **28** and **30** can be adjusted to accommodate different size heads of users. The first strap **28** is positioned to loop around the back of the user's head and the second strap **30** is positioned to loop over the top of a user's head.

The orientation of the snorkel **14** is described herein with regard to a user's mouth, with "lower" and "proximate" portions being closer to the user's mouth compared to "distal" and "upper" portions which are further from the user's mouth.

The snorkel **14** comprises a mouthpiece **34**, a mouthpiece holder **36**, a generally flexible lower connector **38**, a main snorkel body portion **40**, a generally flexible upper connector **42**, and an upper extension **44**. The mouthpiece holder **36**, the lower connector **38**, the main body portion **40**, upper connector **42**, and the upper extension **44** are each generally

hollow and tubular, and in combination provide a water-tight breathing tube **45** which allows the user to breathe face down in the water.

The main snorkel body **40** is generally rigid in construction, i.e., is substantially stiff, and can be formed of materials such as synthetic thermoplastic. The main body **40** can have a recess **46** proximate to the nose of the user so as not to impinge upon a user's nose. The swimming design may be used with a nose clip to avoid water from entering the nose. The main body **40** is rigidly connected to the central portion **20** of the eyepiece frame **16** by a molded connector ultrasonic welding, or adhesive bonding.

The mouthpiece holder **36** is also substantially rigid in construction and includes a rearward projecting extension **48**, on which the mouthpiece **34** can be removably or permanently positioned. The mouthpiece **34**, which is of conventional shape, can be molded from silicone rubber or the like.

The mouthpiece holder **36** can include a unidirectional valve **50** of the diaphragm type, which is normally closed. The valve **50** serves to drain the snorkel when water becomes trapped therein during use.

Snorkel body **40**, mouthpiece holder **36** and upper extension **44** are molded of a more rigid material whereas connectors **38** and **42** are molded of a more pliable material. The snorkel main body portion **40**, the mouthpiece holder **36**, the connectors **38** and **42** and the upper extension **44** can be molded of a synthetic thermoplastic material, and optionally can have mating body halves which are mirror images with respect to each other for assembly by a conventional adhesive or by ultrasonic welding. The halves can be formed with a parting line and can include a tongue and groove configuration so that the body halves can be assembled in an airtight manner.

The lower connector **38** provides an indexed adjustable slip joint between the mouthpiece holder **36** and the main body portion **40**. It allows the mouthpiece holder **36** to slide up and down relative to the main body portion **40** to accommodate different size users. It also allows the mouthpiece holder **34** to rotate or twist away from a user's mouth to permit the

user to move it out of the way when the user's head is above the surface of the water to clear the snorkel or talk to another person. In the scuba version, this also allows the mouthpiece to be twisted away to allow the use of a regulator in diving activities. The lower connector **38** can be shaped so that it is biased away from the user's mouth so that a user, merely by opening his or her mouth, can have the mouthpiece **34** spring out of the mouth, thereby allowing release of the mouthpiece without use of a hand.

The lower connector **38** can be made of a flexible material, such as silicone, urethane, or rubber.

The rearwardly projecting extension **48** has two orifices, a lower elongated breathing orifice **52**, and an upper smaller purge orifice **54**, which is generally circular in cross-section. The entrance **56** to the breathing orifice **52** is more forward than the entrance **58** to the purge orifice **54**, i.e., the breathing orifice entrance **56** is more distal from the mouth of the user than is the purge orifice entrance **58**. The entrance **56** to the breathing orifice **52** is shaped so that it can be closed off by a user with the user's tongue which thereby acts as a valve.

The breathing orifice **52** is directly connected to the breathing tube **45** by which air enters the user's mouth. The smaller purge orifice **54** is connected to a purge tube **60** that is substantially smaller in diameter than the breathing tube **45**, and which is contained within the breathing tube **45**. The purge tube **58** forms a passage from the purge orifice **54** to the space **62** formed by the space around the user's eyes, the sealing member **22**, and the lenses **18** and **19** via opening **63**. In use of the purge tube **60**, a user places his or her tongue in position to seal off the entrance **56** to the breathing orifice **52** without blocking the purge tube entrance **58**, and then pressurizes the purge orifice **54** by blowing into it, and thereby purges the area **62** around the eyes of any water. Thus, purging can be effected without any use of the user's hands and without the user lifting his or her head above water.

The upper extension **44** of the snorkel **14** is connected to the main body portion **40** by the upper connector **42**. The upper extension **44** extends above the water line in use, and it and the main body portion **40** are configured to provide a curvature so that the snorkel is

proximate to a user's head to reduce drag while swimming. The upper connector **42** provides an indexed slip joint with the upper extension **44** so that the upper extension **44** can move axially relative to the main body portion **40** to accommodate different sizes of users' heads with reduced hydrodynamic drag and sway.

The upper extension **44** can be made of a rigid material such as synthetic thermoplastic. The connectors **38** and **42** can be made of a relatively flexible material such as silicone, urethane, vinyl or rubber.

The lower surface **64** of the upper extension **44** proximal to the user's head can be provided with a recess **66** for receiving the second strap **30** for stabilizing the upper extension **44**.

The upper end **68** of the upper extension **44** has an opening **70** to allow the entry of breathing air. Optionally, the extension **44** can have one or more baffles **72** to separate water that splashes into the upper tubular extension **44** with a flowout opening **74** at the base of the baffle **72** to allow water to flow out of the passage in the upper extension **44**.

As shown in Fig. 7, optionally, main body portion **40** of the snorkel **14** includes a forwardly extending projection **76**. The projection **76** is configured and positioned to be just below the water line when the user is swimming. This reduces drag on the swimmer when passing through the water by creating a balancing negative bow wave. Since hydrodynamic drag on a swimmer is related to the height of the bow wave created by the swimmer passing through the water, reduction of the bow wave height through the use of the submerged forward protrusion **76** lessens the overall drag on the swimmer.

A version of the invention particularly adapted to the use of scuba activities is shown in Figs. 8-11. In this version, there is a pivot connection **100** in the main body portion **40**, i.e., the main body portion has a lower segment **102** and an upper segment **104** which are pivotally connected together at a pivot connection **100** to permit the lower segment **102** to swivel upwardly relative to the upper segment **104** which is rigidly attached to the frame **16**. A first configuration for this structure is shown by solid lines in Fig. 8 and a second configuration is

shown by a phantom line **108** in Fig. 8. By rotating the lower portion **102** upwardly about the pivoting connection **100** from the first configuration shown by line **108** to the second configuration, the mouthpiece **34** is moved out of the way of the user, so that a scuba regulator can be used. The pivot connection **100** is above the location **109** where the main body **40** portion is rigidly connected to the eye cover **12**.

As shown in Figs. 10 and 11, the pivot connection **106**, also referred to as a swivel connection, comprises a generally cylindrical projecting element **112** projecting from the lower segment **102** that rotates within a conformally shaped cylindrical recess **114** in the upper section. Its disengagement is prevented by a retaining element **116** that can be bonded in place by an adhesive. An O-ring **118** or other type of sealing device is used to prevent water leakage.

In order to hold the lower segment **102** in its up position in the first configuration, the lower segment **102** has a pair of detents **132**, each of which receives a mating projection **134** of the upper segment **104**. So that the purge tube **60** can accommodate this twisting motion it can be provided with a swivel connection.

A device incorporating all of the features of the present invention has significant advantages. For example, the snorkel is close to the center of a user's face and thus does not block peripheral vision. It also stabilizes the mask or goggles. Because of the rigid attachment between the eyes in the central location of the snorkel, the frame of the goggles is supported. It is possible to have a purge tube for clearing goggles or a mask without use of the hands under water. It reduces hydrodynamic drag compared to when the snorkel is off to the side or only flexibly attached to the goggles. The rigid attachment of the snorkel to the goggles helps maintain the goggle lenses in the same plane in the majority of the viewing section, allowing for a clear non-distorted view.

The invention integrates swim goggles or mask with a breathing tube that has the ability to purge the snorkel or goggles/mask of leaked water separately and independently without the use of the hands during the swimming activity, without a pause in the strokes. The shape of

the breathing tube can be sculpted to provide a low drag device for the swimmer. The central location of the breathing tube permits other features to be incorporated into the shape of the breathing tube, such as means for directional control to balance an uneven stroke and the ability to develop more or less flotation from the breathing tube. With the rigid attachment of the breathing tube to the mask/goggle several different configurations for masks and/or goggles may be attached to a single breathing tube design and still access the benefits of the rigid attachment.

Although the present invention has been described in considerable detail with reference to certain preferred versions thereof, other versions are possible. For example, as shown in Fig. 8, the snorkel can be provided with a light source, such as light emitting diodes 144 mounted on a battery containing support 146 that is pivotally mounted to the upper extension 44. Therefore, the spirit and scope of the appended claims should not be limited to the description of the preferred versions contained herein.

All features disclosed in the specification, including the claims, abstracts, and drawings, and all the steps in any method or process disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive. Each feature disclosed in the specification, including the claims, abstract, and drawings, can be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

Any element in a claim that does not explicitly state "means" for performing a specified function or "step" for performing a specified function, should not be interpreted as a "means" for "step" clause as specified in 35 U.S.C. § 112.